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# What promotes greater use of the corporate bond market? A study of the issuance behaviour of firms in Asia

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This paper investigates bond market development in Asia by exploring the determinants of firms' decisions to issue public debt in a range of Asian economies. Using a novel database covering the period 1995 to 2007, we use comparable micro level panel of nine countries—China, Hong Kong SAR, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand—to explore factors that promote bond issuance by firms. We control for firm characteristics and market features such as bond market depth and liquidity; we also consider supra-national policy initiatives to improve bond market function. Our paper demonstrates that regional initiatives have been an important step towards greater bond issuance by firms in Asia, mostly by fostering market deepening and improving liquidity.

JEL classifications: E22, F32, G32.

## 1. Introduction

The Asian Crisis of 1997–8 was a harsh lesson for countries exposed to borrowing in foreign currency. The crisis caused the US dollar peg to slip in many Asian countries and liabilities such as foreign currency bank loans increased significantly when measured in domestic currency terms. At the same time, the withdrawal of foreign capital and the fire sale of assets caused a deterioration on the other side of the balance sheet, with severe implications for banks and firms (Spiegel, 2012). The result was an imbalance between domestic assets and liabilities with its roots in the currency mismatch between assets and liabilities. These events prompted calls for the development of financial markets, and particularly local currency bond markets, to reduce exposure to the currency mismatch problem in the future.<sup>1</sup>

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<sup>1</sup> See Batten *et al.* (2012) for a discussion on foreign bond markets and financial development in Asia.

As a result, there were a number of policy initiatives that were undertaken by the Asian governments specifically to encourage the bond market development. Eight Emerging Market East Asian and Pacific (EMEAP) countries co-ordinated the issue and trading of sovereign and quasi-sovereign bonds in 2003 by creating an Asian Bond Fund (ABF) that purchased \$1bn of dollar- and local currency-denominated government bond issues via the Pan Asian Bond Index Fund (PAIF) and the Fund of Bond Funds (FoBF). In December 2004 this was supplemented by the Asian Bond Fund 2 (ABF2) which invested \$2bn in domestic currency-denominated bonds issued by sovereign and quasi sovereign issues in the EMEAP countries excluding Australia, New Zealand and Japan. A further initiative undertaken by the ASEAN countries, with the support of the Asian Development Bank, sought to improve the infrastructure of the bond markets through the Asian Bond Market Initiative (ABMI), in order to create a more integrated regional market.

Have these policies worked? Figure 1 provides two different measures of bond market development to allow us to evaluate the growth of bond markets in Asia. The first panel shows that corporate bonds outstanding have been growing rapidly since 1995. There was a step increase in the volumes outstanding in 2000, and an increasing rate of expansion from that point onwards. To evaluate bond issuance we refer to the second panel of Fig. 1. This shows that issuance of local currency bonds did in fact follow a similar trajectory to the volumes outstanding, with a very large jump in the early 2000s and a growing volume of issuance thereafter, with only a brief pause in 2010.

Figure 2 compares the growth of bond markets against the growth in real activity, measured by GDP. Taking the ratio of bond market capitalization to GDP, we can observe whether markets grew at the same pace or faster than the real economy. The first panel of Fig. 2 shows that the ratio increased for the region as a whole: growth in bond market capitalization exceeded GDP growth. The initial ratio of 7% in 1995 increased to over 34% by 2011, which is approximately a fivefold increase, albeit from a low base. The second panel of Fig. 2 shows that the country level experience is more diverse. Taking data at the country level we report figures for 2000 and 2011, which show that bond markets in the financial centres of Hong Kong SAR and Singapore grew rapidly, as did Taiwan, while others grew at a more measured pace, and bond markets in Indonesia and the Philippines actually contracted. Compared to other emerging markets such as Latin America, Asian bond markets are approximately three times larger on the basis of the ratio of local currency bonds outstanding to GDP (see Eichengreen *et al.*, 2006). Moreover, the percentage change in total domestic bonds outstanding over the period 2000 to 2008 was 244.2 for Asia, while for all markets covered by the Bank for International Settlements it was equal to 104.5 (see Batten *et al.*, (2012)). In order for local bond markets to develop there has to be a conducive environment for issuance on the supply side and investment on the demand side. This paper seeks to determine, at the level of the firm, the extent to which policy initiatives aimed at issuers and investors have influenced firms' decisions to issue corporate bonds.

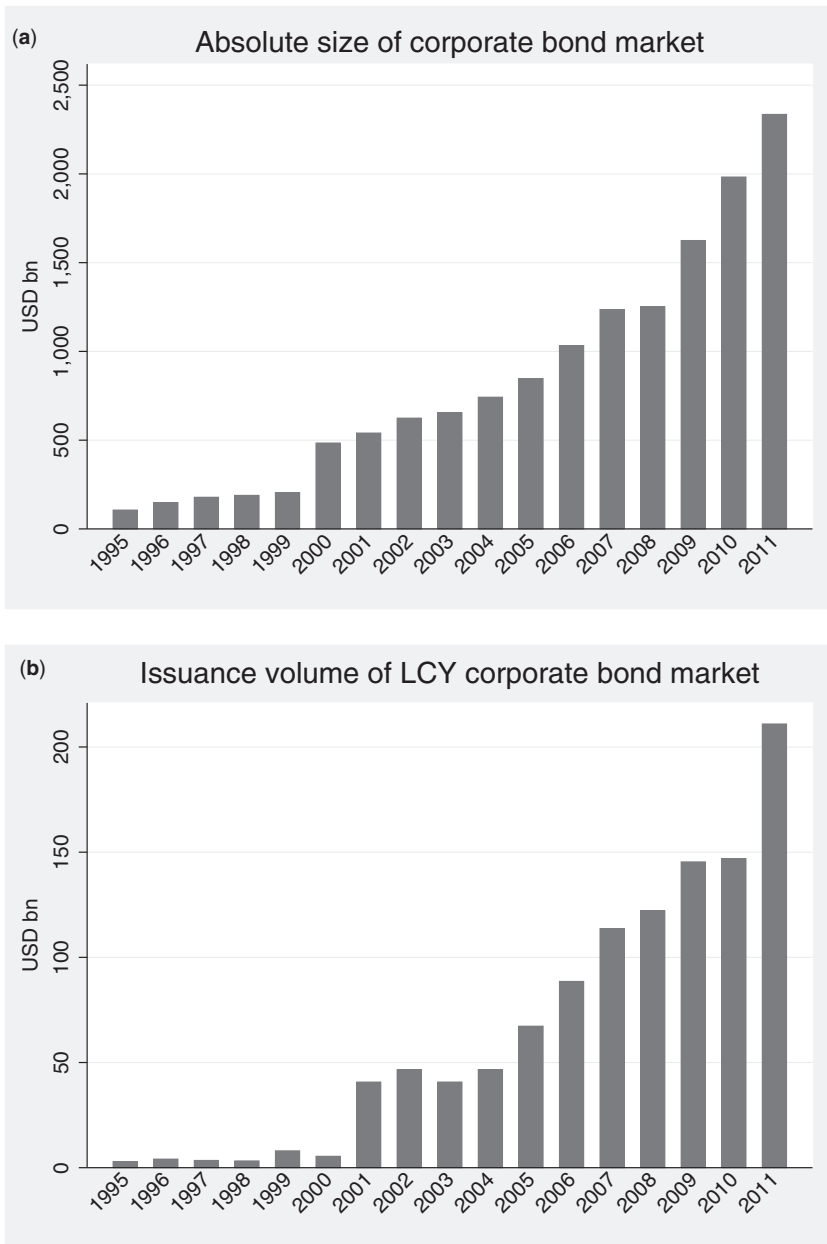
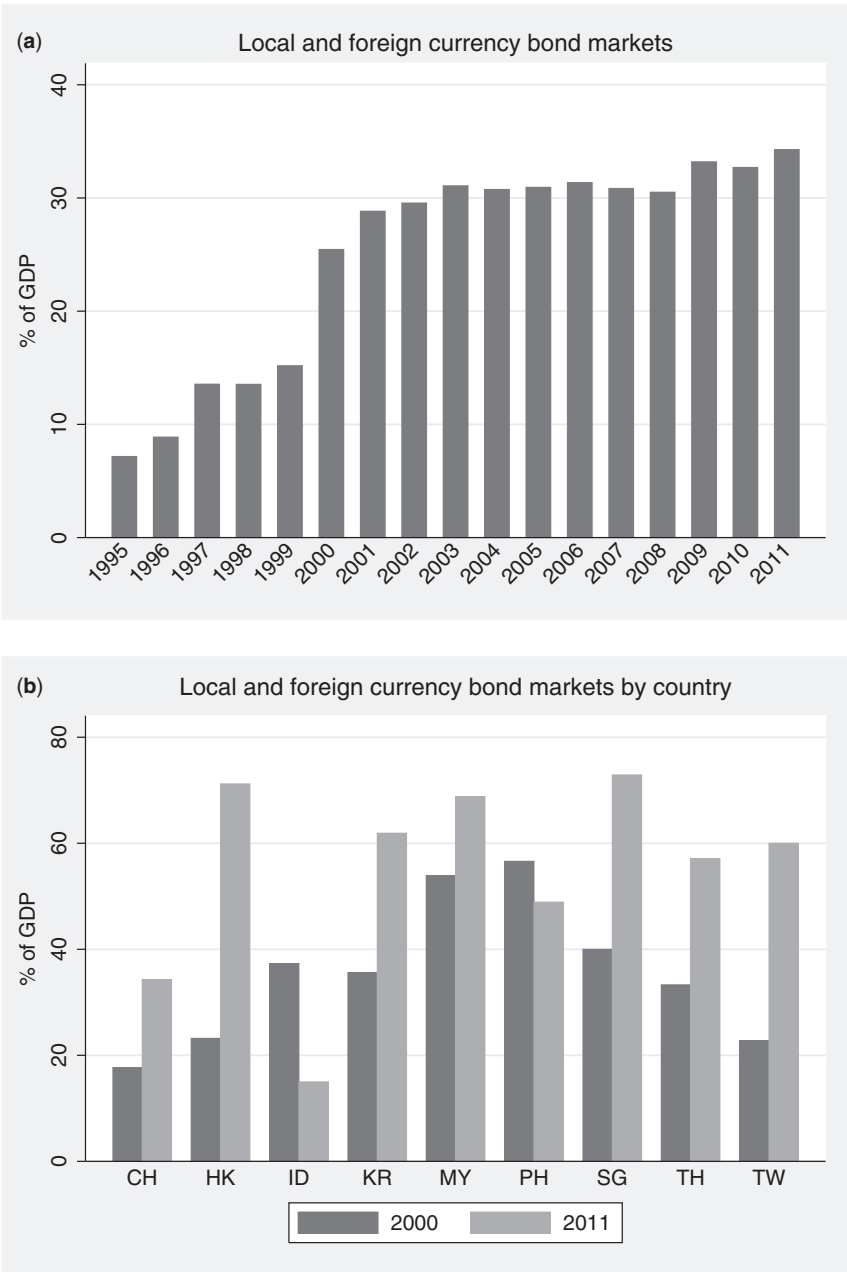


Fig. 1 Size of Asian corporate bond markets.

The paper is relevant to two important literatures on corporate financial developments in Asia. First, it notes that firms in Asian countries have greater dependence on bank finance than firms in Latin America (see Burger and Warnock, 2006, and Eichengreen *et al.*, 2006). This literature considers why Asia



**Fig. 2** Size of Asian corporate bond markets as a percentage of GDP  
*Notes:* Country abbreviations: CH = China; HK = Hong Kong; ID = Indonesia; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan.

does not have larger bond markets, focusing on macro explanations tied to size, volatility and liquidity of the markets as a function of institutional features such as accounting standards, law and order, bureaucracy, and corruption (see Eichengreen and Luengnaruemitchai, 2004).<sup>2</sup> But beyond the macro influences on bond markets, there are studies of firm-level influences in Latin American bond markets as summarized in Borensztein *et al.* (2008). We contribute to this literature using firm-level data from Asian countries.

Second, bond markets in Asia may be small because firms do not need extensive market finance to invest and grow: internal funds may be sufficient while they are relatively small. Small and medium sized enterprises rely on internal funds to finance firm-level investment (see Guariglia *et al.*, 2011, and Song *et al.*, 2011). In these circumstances we could understand why firms issue relatively few corporate bonds; but as they grow they may require bond finance. In our study we confirm access to liquid assets has a negative effect on the probability of bond issuance at the firm level as this literature suggests.

Despite the importance of this topic, few studies have looked at the determinants of corporate bond issuance in Asia. Chinn and Ito (2006) explain financial development using indicators of capital market openness, legal, institutional and accounting improvements, and Eichengreen *et al.* (2006) examine the underdevelopment of Asian bond markets relative to Latin American bond markets, but neither take into account firm characteristics. Girma and Shortland (2008) evaluate economic development at the aggregate level following Beck *et al.* (2001), and extend this work to analyse the influence of political factors following Rajan and Zingales (2003), but their definition of financial development is restricted to the ratios of private sector credit and two measures of stock markets finance to GDP, excluding bond market finance. Studies in Borensztein *et al.* (2008) focus on Latin American firm-level data to explore the determinants of bond market participation at the firm level, but they do not extend their studies to Asia. None of the research that we are aware of considers the impact of the Asian bond market initiatives at the corporate level.

To study firms' issuance behaviour in Asia, we construct a matched firm-level regional panel of data for nine Asian countries over the period 1995–2007 comprising 43,653 annual observations on 4,868 firms. This provides us with a unique dataset combining bond market data with firm-level information from the balance sheet, that allows us to explore the central question using corporate information. We examine whether market factors influenced the firm's decision to issue bonds by improving the financial environment following Eichengreen *et al.* (2006) and Chinn and Ito (2006) since larger markets with greater liquidity are more likely

<sup>2</sup> A recent paper by Chinn and Ito (2006) confirms that the macro features such as size, value, and liquidity of financial markets in developed and emerging countries are closely related to institutional features such as capital market openness, and legal, institutional, and accounting improvements.

to encourage firms to issue bonds.<sup>3</sup> Country dummies allow for heterogeneity across national bond markets. Therefore we contribute to the literature in two ways.

First, we consider the impact of the Asian Bond Funds (ABF and ABF2) and the Asian Bond Market Initiative (ABMI). Eichengreen *et al.* (2006) and Burger and Warnock (2006) have argued that market scale was a significant impediment to the development of the corporate bond markets in emerging economies, but these markets have grown in scale and liquidity during our sample period. Moreover, Spiegel (2012) notes that it would be reasonable to expect an improvement in market liquidity between the launch of the Asian Bond Market Initiative and the beginning of the global financial crisis. In order to separate the effects of this regional development from the effect of regional policy initiatives, we refer to Taiwan as a control. Taiwan saw similar development in its national bond market, but it did not participate in the ABF, ABF2, or ABMI initiatives. A difference-in-differences model will tease out the regional bond development and policy influences. The results from this assessment show that there was a positive influence on corporate bond issuance in the ABF, ABF2, or ABMI participating countries.

Second, in order to understand the result from our difference-in-difference model we consider how ABF, ABF2, and ABMI might have influenced firms. The initial objective of these policies was to increase market size and liquidity, c.f. ASEAN (2008), and this is what they have done, as Chan *et al.* (2011) demonstrate, although other impediments are still to be removed.<sup>4</sup> Scale and liquidity have direct effects on the probability of bond issuance since they affect costs of entering and exiting the market, and they reduce uncertainty and thresholds for entry. They do this by revealing more accurately the firm's financial condition in the market, and encourage the development of lower cost, local underwriting and rating agencies. There is also an indirect effect from market factors to firm-specific factors because in a world with imperfect information these influences do not necessarily affect all firms equally, but vary with the characteristics of the firm. There is evidence in our results that market size and liquidity have a small significant direct and indirect effect on the probability of issuance. Since we can be quite precise about the timing—ABF was introduced in June 2003, ABMI began co-ordinating bond markets in 2003, and ABF2 was rolled out in June 2005—our exploration of how much influence the initiatives had on bond issuance at the level of the firm before and after the policy began in 2003 can help provide independent confirmation that policy increased bond issuance.

<sup>3</sup> These quantitative indicators may also proxy for the qualitative indicators such as foreign investor participation, transparency etc that are cited in surveys of bond market development in Asia conducted by, among others, the Asian Development Bank, but do not have sufficient time dimension to include in a panel study such as our own.

<sup>4</sup> These other barriers are more difficult to measure on a consistent basis for all countries over our sample, so we refer to scale and liquidity effects.

We conclude that regional initiatives have been an important step towards greater bond issuance by firms in Asia, mostly by fostering market deepening and improving liquidity. The Bank for International Settlements has suggested that the ABMI policies in 2003 had greater impact on sovereign issuance, while the later ABF initiatives encouraged greater investor participation (see Chan *et al.*, 2011). We confirm this view in our analysis.

The rest of the paper is organized as follows. Section 2 summarizes Asian bond market development over the last decade and a half. Section 3 discusses the factors that influence the bond market participation decision. In Section 4 we describe our data sources and characteristics. Section 5 reports our results and Section 6 concludes.

## 2. Asian bond markets

The Asian region has long recognized that it has relatively less developed bond markets in Hong Kong SAR, Indonesia, Philippines, Singapore, and Thailand; only Malaysia and Korea are exceptions in this regard, but even here the scale of the bond markets is closer to European than US levels as a percentage of GDP. The Asian crisis underlined the vulnerability of corporations to small underdeveloped bond markets. Larger corporations were heavily dependent on bank finance in domestic and foreign currency and equity finance, while smaller and medium sized enterprises were almost exclusively reliant on domestic bank loans. Domestic banks in turn depended on short-term dollar denominated funds to finance these domestic currency loans creating a potential currency mismatch between assets and liabilities on their balance sheets. The crisis caused funding to banks and corporates to fall, and small local bond markets were unable to provide a 'spare tyre' for firms, c.f. Borensztein *et al.* (2008), amplifying its real effects.

In the post-crisis period, building deep and liquid regional bond markets became a priority for policymakers to foster the development of a more diversified and efficient financial sector (see Gyntelberg *et al.*, 2005). But the fact that bond markets were separated by country, with low liquidity, limited investor participation, underdeveloped infrastructure, and few intermediaries did not make this easy to achieve. It is widely accepted that total market capitalization of between \$100–200bn is required to achieve critical mass (see McCauley and Remolona, 2004, and Eichengreen *et al.*, 2006); but many emerging Asian bond markets excepting those in Korea, and more recently China, Malaysia, and Thailand, have failed to reach this level. Until a market reaches this critical size, trading volumes remain low, bid-ask spreads will be wider than comparable markets elsewhere (if not constrained by market regulations as many are in Asia) and both issuers and investors will remain few in number. It is suggested that a larger public bond market could be a spur to corporate bond issues because market size is a critical indicator of the viability of bond market finance for firms.

Regional governments are aware of this and have taken large strides to improve the bond markets at the country and regional levels. Governments have (i) issued



increasing numbers of sovereign or quasi-sovereign bonds to establish a yield curve off which corporate bonds can be priced; (ii) improved market infrastructure to ensure prices and volumes are recorded more quickly, and improved the settlement process; (iii) encouraged local ratings agencies to provide information on bond issues, reducing information asymmetry; (iv) widened investor participation in bond markets beyond institutional investors such as private pension funds, insurance companies, and investment trusts by lowering the bureaucratic hurdles involved with registration and participation; (v) enhanced foreign investor participation by liberalizing the withholding taxes and reporting requirements, and foreign entities have been encouraged to issue bonds themselves.

Perhaps the most prominent initiative has been the move towards a regional bond market, and here there have been two major developments. First, following discussions among the senior executives of the regional central banks the Asian Bond Fund was launched in 2003. Initially this was a commitment by eight Emerging Market East Asian and Pacific (EMEAP) countries to set aside \$1bn of reserve assets in a closed end fund to purchase dollar denominated Asian government bond issues. The ABF2 initiative, launched at the end of December 2004, extended the project to local currency government bond issues through the Pan Asian Bond Index Fund (PAIF) and the Fund of Bond Funds (FoBF). The investment was enlarged to \$2bn per country in an open ended fund which was accessible to private sector investors. Second, an Asian Bond Market Initiative (ABMI) launched in 2002 under the ASEAN framework with technical support from the Asian Development Bank. This spurred a number of initiatives to develop regional bond markets including (i) the intention to create a robust primary and secondary market for securities by large sovereign bond issues by Asian governments and quasi-government agencies to establish benchmarks, (ii) Asian government financial institutions' financing requirements intention to meet in Asia, and (iii) a series of new ventures to create asset-backed securities markets, bond issues by multilateral development banks and government agencies, and bonds to fund foreign direct investment in Asian countries. Several working groups have been established to take these forward.

A review of these developments was commissioned by the EMEAP Working Group on Financial Markets (Chan *et al.*, 2011). This report concluded that the government bond market had taken considerable steps forward, in terms of market size and liquidity, largely due to the expansion and consolidation of new issuance at key benchmark maturities, the emergence of market making brokers in inter-dealer markets, and the reduction of participation costs for non-resident investors. Expansion of bond markets has varied across Asia since 2003, with the largest growth seen in China, Malaysia and Thailand, but relatively little growth observed in the Philippines and Indonesia. The size of the sovereign bond markets in Malaysia and Thailand now exceeds the \$100 billion threshold thought necessary for a deep and liquid bond market, but the move to consolidate the issues at key maturities has meant that overall size and market liquidity at those key maturities are less closely linked.

### 3. Influences on the bond market participation decision

#### 3.1 Factors that affect a firm's bond issuance decision

**3.1.1 Firm-specific characteristics** Previous literature suggests that a firm's size has a positive impact on access to public finance and is expected to increase the probability of a bond issue (Calomiris *et al.*, 1995, and Datta *et al.*, 2000). Growing firms are also more likely to issue bonds than firms that have fewer opportunities for expansion because they have greater demand for external funding (see Pagano *et al.*, 1998, and Datta *et al.*, 2000). If there are complementarities between issuing equity and bonds, then the number of years a firm has been listed on the stock market may indicate the recognition that a firm receives when it issues; it may also indicate the relationships a firm has built up with banks (see Boot and Thakor, 2000).

The financial condition of the firm is also an important determinant of access to external finance as argued by Leland and Pyle (1977), Myers and Majluf (1984), Rajan (1992), and Pagano *et al.* (1998). High leverage can be associated with an unhealthy balance sheet and therefore firms with higher levels of debt face greater difficulties obtaining funds on the markets, especially during recessions (see Cantor, 1990, and Bougheas *et al.*, 2006). Yet, some authors argue that the probability of raising public finance increases with firms' leverage (see Pagano *et al.*, 1998, Datta *et al.*, 2000, and Dennis and Mihov, 2003) since a high rate of leverage can be seen as an indicator of a good credit standing and high borrowing capacity of firms. Moreover, firms with high leverage could have higher roll-over needs, and therefore may have greater demand for additional funding from bond markets.

As with leverage, liquidity can have a positive or negative influence on the decision to issue. Low liquidity indicates both the need to raise funds on the demand side, and a signal of low creditworthiness, deterring creditors from offering finance on the supply side. Hale and Santos (2008) find that firms with more liquidity take longer to enter the public bond market due to the fact that they have substantial internal funds, which confirms the findings of Guariglia *et al.* (2011) for firms in China. Liquidity is also used by Mateut *et al.* (2006) to determine whether firms resort to bank finance.

Dennis and Mihov (2003) argue that bond financing should be more viable for firms with high profits. It is similar in many respects to cost of sales, which records the operating costs associated with the production of goods and services. While profits would contribute to the likelihood of bond issuance, cost of sales would detract from it. There is evidence, however, that profitability may not have such high importance for Asian firms as it does in the US and Europe. In the case of China, profitability matters for private firms but not for the state-owned firms, as the latter are still enjoying soft budget constraints (see Ding *et al.*, 2010). To deal with this issue we replace profitability with cash flow, measured as the sum of the firm's net income and depreciation over total assets, to check the robustness of our findings.

The firm's ability to pledge collateral for debt finance is found to be very important in studies on debt composition (Demirguc-Kunt and Maksimovic,

1999, and Booth *et al.*, 2001). Assets that are more tangible, sustain more external financing because tangibility increases the likelihood that resources can be recaptured by creditors in case of borrower's default.

### 3.1.2 Market development characteristics

Following Chinn and Ito (2006) and Eichengreen *et al.* (2006) we use two indicators to assess the depth of the Asian markets: the ratio of local currency bond issues relative to GDP and the extent of trading in the secondary market relative to the amount of bonds outstanding. We report these indicators in successive columns due to the fact that they are quite highly correlated with each other (the correlation coefficient is 0.51). The size of local currency bond obligations as a percentage of nominal GDP measures the size of the domestic markets compared to the output of the economy, while the trading volume is a measure of bond market liquidity. Local currency issues have risen as a percentage of GDP from 4% at the start of our sample to between 20-25% at the end, while trading volume in the secondary market has risen to over 100 times outstanding volume from a multiple in single digits over the same period. Arguably the more liquid the market is the lower its transactions costs and the less impact trades have on market price (see Jiang and McCauley, 2004). Burger and Warnock (2007) argue that emerging economies are able to develop local currency bond markets if they are given the opportunity to do so, and this seems to be borne out by the market development data.<sup>5</sup>

The resulting model we employ is a probit model (c.f. Wooldridge, 2010):

$$\Pr(BOND_{ijt} = 1) = F(\alpha_j + X_{ijt-1}\beta + \phi Z_{jt} + \epsilon_{ijt}) \quad (1)$$

The dependent variable,  $BOND_{ijt}$ , takes a value equal to one for each firm,  $i$ , issuing a bond in country  $j$  at time  $t$ . The function  $F(\cdot)$  is the standardized normal distribution. The matrix of explanatory variables,  $X_{ijt-1}$ , comprises those firm-specific variables which are lagged one period to mitigate potential endogeneity concerns, and  $Z_{jt}$  refers to a market development measure for each country discussed above. Coefficients in matrix  $\beta$  and scalar  $\phi$  are estimated and  $\epsilon_{ijt}$  is an error term. Our model includes a number of dummies to control for common trends, business cycle effects and industry fixed effects across industries, but of particular interest to us are the differences across countries given the heterogeneity across the region. These effects are measured by  $\alpha_j$  and are reported in our results as country effects.

### 3.2 Difference-in-differences model

To a great extent the impact of the ABF, ABF2, and the ABMI policies will be observed through their effects on market size and liquidity, but in order to

<sup>5</sup> We have also experimented with the influence of measures of banking system development and health, such as the net interest margin and the Z-score, but these variables were not statistically significant in influencing the firm's desire to access the bond market.

disentangle the effects of the policy from general bond market development, we consider the use of a control group, Taiwan, which experienced a similar trajectory of bond market expansion but did not participate in the ABF, ABF2, and the ABMI initiatives.<sup>6</sup> We use the difference-in-differences estimator to determine whether firms in the eight country group that experienced the policy treatment (treated group) were more likely to issue bonds after the policies were implemented compared to firms in Taiwan (control group).

The strategy analyses those firms that were non-issuers before 2003, and examines their behaviour in the period after the policy initiatives began. Our conventional difference-in-differences specification, following the seminal study by Card and Krueger (1994), makes allowance for other sources of variation in issuance by referring to the control group, and separates the difference in issuance due to the policy treatment in the treated group. The impact of the policy on the probability of bond issuance is specified as follows:

$$Pr(BOND_{ijt} = 1) = F(\alpha_j + X_{ijt-1}\beta + \phi Z_{jt} + \gamma POLICY_{jt} + \epsilon_{ijt}) \quad (2)$$

The terms are identical to those defined in the previous sub-section and in addition we have the term  $POLICY_{jt}$  as an indicator that takes a value equal to one when the country  $j$  participated in the policy initiative at time  $t$ . The estimates are obtained using a difference-in-differences estimator. If policy had a significant effect on issuance in bond markets we expect to find a significant difference between the treated and untreated groups in the form of a significant coefficient on the  $POLICY_{jt}$  variable.

### 3.3 Direct and indirect effects of bond market development

We have noted how the growth in bond market size and liquidity in Asia, could potentially influence the issuance decision of firms by lowering issuance costs. These can be separated into direct benefits that lower the cost for all issuers equally, as markets develop better infrastructures, and indirect benefits, which depend on the characteristics of the participating firm. It is possible that some firms could be in a better position to benefit from the development of bond markets than others because they have greater size or greater creditworthiness, for example. If a bond issuing firm had a stronger balance sheet, measured by higher liquidity, profitability and collateral for example, it might face lower underwriting fees, if the underwriter believes that they will be less likely to be left with a large inventory of unsold bonds. Therefore interactions between market size and liquidity with these variables may increase issuance. The interactions indicate the degree to which larger firms, better collateralized, more profitable firms are more likely to issue because this element of the costs of issuing declines in a generally expanding bond market with greater liquidity.

<sup>6</sup> We considered also using Vietnam as an additional control but there were insufficient observations for this to be possible.

These effects are closely associated with policy initiatives, because the policies were designed to improve the functioning of bond markets, and this may have contributed to greater market size and liquidity. By looking at periods before and after the policy initiative we can determine whether the market development between these two periods advantaged all firms (through statistically significant direct effects) or some firms (through statistically significant indirect effects). In other words, we estimate the model for a pre-policy sample (1995–2002) and a post-policy sample (2003–2007). We can also compare the size of the effects before and after the policy and test for equality of the coefficient estimates on direct and indirect effects. Equality of coefficients would suggest market development had no greater effect before the policy initiative than it had afterwards, while rejection of equality of coefficients would suggest differences between periods after the policy was effected.

## 4. Data

### 4.1 Data description

The data for this study are drawn from several sources and cover firms in both emerging and developed Asian economies namely China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. We use data for the period 1995–2007, which covers a period of major bond market development. We use country dummies to account for the wide regional variation in the transparency, tax treatment, and investor participation in Asian corporate bond markets.

We use Bondware to identify all corporate bonds issued in international markets to gather information about the issue dates, denomination, currency, and the maturity in the bonds measured.<sup>7</sup> We are also able to identify the type of the coupon (i.e., zero coupon, fixed, and floating). For the purpose of our analysis we focus on fixed rate bonds. We use Bloomberg to identify similar data for firms that issue bonds in the domestic Asian markets. Our coverage of bond issues therefore embraces both firms with issues in hard currencies, which are almost exclusively US dollar denominated, and firms with local currency denominated bonds. Although local currency issuance first started to capture the market's attention in the late 1990s new issues in local currency now exceed new issues in dollars for most countries therefore it is important to consider both the local and international currency issues in the Asian markets in order to avoid mis-representing the scale of corporate bond issuance.

The Thomson Financial Primark database offers balance sheet and profit and loss accounts data for firms in the East Asian region. Our initial sample includes a total of 43,653 annual observations on 4,868 companies. We provide information on financial accounts and ratios for Asian firms operating in all sectors of the economy

<sup>7</sup> Our definition of corporate bonds is in line with recent studies on Asian bond markets (see Gyntelberg *et al.*, 2005) and includes all non-government long-term issues in a given currency.

for the years 1995–2007.<sup>8</sup> Finally, bond market size and liquidity indicators are taken from the Asian Development Bank and the Statistical Bureau of Taiwan.

Following normal selection criteria used in the literature, we exclude companies that did not have complete records for all explanatory variables and firm-years with negative sales. We also require the firms have at least three consecutive time-series observations. To control for the potential influence of outliers, we exclude observations in the 0.5% from upper and lower tails of the distribution of the regression variables. Finally, by allowing for both entry and exit, the panel has an unbalanced structure which helps mitigate potential selection and survivor bias. Our combined sample contains data for 546 firms in China, 442 in Hong Kong SAR, 385 in Indonesia, 910 in Korea, 961 in Malaysia, 240 in the Philippines, 582 in Singapore, 207 in Taiwan, and 595 in Thailand that operated between 1995 and 2007 in a variety of sectors including manufacturing, utilities, resources, services, and financials.<sup>9</sup>

#### 4.2 Descriptive analysis

We present correlations of the firm-specific variables used in our empirical analysis in Table 1, where the characteristics have relatively low correlations with each other. Most variables have correlation coefficients below 0.20, and while leverage has higher correlations with variables such as profitability and cash flow, this correlation is never above 0.40. As expected cash flow and profitability are more highly correlated, with a correlation coefficient of 0.68, therefore we use these two variables in separate regressions.

Summary statistics for the variables used in our empirical analysis are provided in Table 2. The figures are presented for all firms (panel A), those firms that are issuers (panel B) and those that are non-issuers (panel C) reporting mean, standard deviation, minimum and maximum values, and the number of observations. We observe that size and growth opportunities are very different for issuers and non-issuers and the differences are statistically significant in both cases (p-values of a test of the equality of means are 0.00 in both cases). The mean value of the log of assets is higher for bond issuers (equal to 17.37) compared to non-issuers (equal to 14.14). Moreover, bond issuers have higher average growth rates (10.9% versus 7.4%). Dennis and Mihov (2003) and Hale and Santos (2008) indicate that larger firms typically have more public debt and Datta *et al.* (2000) find that the likelihood of bond issues is increasing in the firm's size and the need for external

<sup>8</sup>We used ISIN codes in order to link bond-specific data from Bloomberg with accounting data from Thomson Financial. In addition, the matching of the bond data from Bondware with data from Thomson Financial was made feasible using firms' names.

<sup>9</sup>Our dataset includes both non-financial and financial firms because the latter are dominant issuers in markets such as Hong Kong SAR, Korea and Singapore (see Ma *et al.*, 2005). However, non-financial firms constitute the vast majority in our sample. Specifically, only 8.8% of the observations in our sample correspond to financial, insurance, or real estate firms. The results do not change in qualitative terms if we exclude financial firms from our sample.

Table 1 Correlation matrix

	SIZE	GROWTH	YEARS	LEVER	PROF	CF	LIQUID	COLL
SIZE	1.00							
GROWTH	0.03	1.00						
YEARS	-0.16	-0.06	1.00					
LEVER	0.14	-0.07	-0.01	1.00				
PROF	-0.01	0.24	-0.02	-0.40	1.00			
CF	-0.001	0.16	0.01	-0.27	0.68	1.00		
LIQUID	-0.15	0.06	-0.11	-0.21	0.13	0.10	1.00	
COLL	0.004	0.05	-0.02	-0.02	-0.04	-0.04	-0.11	1.00

Notes: The Table presents correlations for firm-specific indicators. *SIZE*: Logarithm of total assets. *GROWTH*: Growth in sales. *YEARS*: Number of years a firm has been listed on the stock market. *LEVER*: Total debt to total assets. *PROF*: Earnings before interest and taxes relative to total assets. *CF*: The sum of the firm's net income and depreciation over total assets. *LIQUID*: Current assets over total liabilities. *COLL*: Tangible assets relative to total assets.

funding. This finding is also consistent with the literature on Latin American bond markets (see Borensztein *et al.* 2008). Finally, there are many more non-issuers (89%) than issuers (11%) in our sample.

On the basis of mean values of many financial indicators we find that issuing firms are significantly different from non-issuing firms. Issuers are more leveraged and less liquid, having a leverage ratio of 37% (issuers) to 27% (non-issuers) and a liquidity ratio of 41% (issuers) to 48% (non-issuers). This supports the notion put forward by a number of studies (see Pagano *et al.*, 1998, Datta *et al.*, 2000, and Dennis and Mihov, 2003) that highly leveraged firms are successful and have higher borrowing capacity. In addition, since issuing firms have greater debt, and less liquidity, they have greater incentive to access bond markets for additional finance. We also find that bond issuers are more profitable but the difference is at the margin of significance (p-value is 0.06). There is also a significant difference between the collateral of issuers and non-issuers (p-value is 0.00), therefore having more tangible assets is an advantage for bond issuance. In summary, we note that firms' balance sheet indicators are significantly different for issuers compared to non-issuers, and it is possible that differences in financial health are important determinants of the decision to issue bonds.

5. Results

5.1 Influences on the decision to issue

Table 3 reports the estimates of various models that examine the relationship between firm-specific characteristics, market development measures and the probability that a firm will issue bonds. We report these alternatives to gauge whether the relationship is linear (columns 1 and 3) or nonlinear (columns 5 - 11). We also check whether our results are robust to considering the probability of bond

**Table 2a** Descriptive statistics-all firms

Variable	Mean	Std. dev.	Min.	Max.	N
SIZE	14.495	4.174	0.847	24.26	28887
GROWTH	0.078	0.42	-2.883	2.417	28887
YEARS	13.591	4.668	1	25	28887
LEVER	0.284	0.242	0	2.258	28887
PROF	0.035	0.141	-1.041	1.223	28887
LIQUID	0.475	0.215	0.011	0.98	28887
COLL	0.025	0.059	-0.021	0.587	28887

*Notes:* The table presents descriptive statistics for firm-specific indicators. *SIZE*: Logarithm of total assets. *GROWTH*: Growth in sales. *YEARS*: Number of years a firm has been listed on the stock market. *LEVER*: Total debt to total assets. *PROF*: Earnings before interest and taxes relative to total assets. *LIQUID*: Current assets over total liabilities. *COLL*: Tangible assets relative to total assets. Currency units are US dollars.

**Table 2b** Descriptive statistics-issuers

Variable	Mean	Std. dev.	Min.	Max.	N
SIZE	17.375	3.68	2.448	24.26	3134
GROWTH	0.109	0.351	-2.294	2.408	3134
YEARS	13.427	4.781	1	24	3134
LEVER	0.378	0.222	0	2.116	3134
PROF	0.035	0.122	-1.035	0.889	3134
LIQUID	0.414	0.198	0.014	0.972	3134
COLL	0.029	0.06	-0.021	0.587	3134

*Notes:* As in Table 2A.

**Table 2c** Descriptive statistics-non-issuers

Variable	Mean	Std. dev.	Min.	Max.	N
SIZE	14.145	4.094	0.847	24.19	25753
GROWTH	0.074	0.427	-2.883	2.417	25753
YEARS	13.611	4.653	1	25	25753
LEVER	0.272	0.242	0	2.258	25753
PROF	0.033	0.143	-1.041	1.223	25753
LIQUID	0.482	0.216	0.011	0.98	25753
COLL	0.025	0.059	-0.021	0.585	25753

*Notes:* see Table 2A.



Table 3 The decision to issue

	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E
	1	2	3	4	5	6	7	8	9	10	11	12
SIZE	0.286*** (25.40)	0.037	0.289*** (25.42)	0.038	0.280*** (24.74)	0.036	0.183*** (16.85)	0.014	0.279*** (24.61)	0.036	0.259*** (21.95)	0.035
GROWTH	0.060** (2.04)	0.008	0.068** (2.25)	0.009	0.053* (1.77)	0.007	0.201*** (4.18)	0.015	0.052* (1.72)	0.007	0.053* (1.68)	0.007
YEARS	-0.003 (-1.14)	-0.0003	-0.003 (-1.32)	-0.0004	-0.003 (-1.16)	-0.0001	-0.003 (-0.10)	-0.0002	-0.003 (-0.99)	-0.0002	-0.004 (-1.37)	-0.001
LEVER	0.685*** (13.49)	0.089	0.639*** (13.84)	0.083	1.727*** (11.94)	0.220	2.328*** (12.94)	0.180	1.712*** (11.89)	0.218	1.753*** (11.42)	0.237
PROF	0.504*** (4.76)	0.066			0.435*** (3.98)	0.055	0.484*** (3.07)	0.037	0.438*** (3.99)	0.056	0.388*** (3.46)	0.052
LIQUID	-0.032 (-0.51)	-0.004	-0.015 (-0.23)	-0.002	0.831*** (3.59)	0.106	0.839*** (2.85)	0.065	0.827*** (3.57)	0.105	0.824*** (3.36)	0.111
COLL	0.631*** (3.30)	0.082	0.656*** (3.43)	0.086	0.536*** (2.74)	0.068	0.391 (1.61)	0.030	0.530*** (2.71)	0.068	0.416** (2.03)	0.056
CF			0.309*** (4.76)	0.040								
LEV <sup>2</sup>					-1.061*** (-6.78)	-0.135	-1.328*** (-7.06)	-0.102	-1.050*** (-6.75)	-0.134	-1.097*** (-6.65)	-0.148
LIQUID <sup>2</sup>					-0.877*** (-3.65)	-0.112	-1.219*** (-3.95)	-0.094	-0.874*** (-3.63)	-0.111	-0.955*** (-3.77)	-0.129
LCY									0.005** (2.44)	0.001		
TRVOL											-0.0001 (-0.42)	-0.00001

(continued)

Table 3 Continued

	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E	Coef.	M.E
	1	2	3	4	5	6	7	8	9	10	11	12
CHdum	0.399*** (5.98)	0.065	0.439*** (6.52)	0.074	0.384*** (5.67)	0.061	0.234*** (2.80)	0.017	0.428*** (6.19)	0.070	0.305*** (4.16)	0.049
HKdum	0.269*** (3.16)	0.041	0.280*** (3.26)	0.043	0.299*** (3.52)	0.046	0.232** (2.14)	0.017	0.377*** (4.19)	0.061	0.198** (2.12)	0.030
IDdum	-0.640*** (-12.77)	-0.056	-0.637*** (-12.55)	-0.056	-0.589*** (-11.70)	-0.052	-0.833*** (-13.07)	-0.026	-0.405*** (-4.40)	-0.040	-0.603*** (-9.85)	-0.057
MYdum	1.347*** (15.87)	0.286	1.368*** (16.02)	0.291	1.331*** (15.60)	0.277	1.283*** (12.39)	0.154	1.303*** (15.07)	0.269	1.170*** (12.38)	0.232
PHdum	0.488*** (6.60)	0.087	0.512*** (6.86)	0.093	0.486*** (6.54)	0.085	0.352*** (3.80)	0.029	0.667*** (6.38)	0.130	0.417*** (3.60)	0.075
SGdum	1.268*** (13.97)	0.299	1.293*** (14.17)	0.307	1.248*** (13.67)	0.288	1.590*** (14.47)	0.270	1.401*** (12.84)	0.340	1.225*** (10.80)	0.319
THdum	0.733*** (10.82)	0.141	0.746*** (10.91)	0.145	0.734*** (10.76)	0.139	0.825*** (10.09)	0.091	0.848*** (10.46)	0.170	0.632*** (8.00)	0.118
TWdum	3.376*** (13.18)	0.908	3.427*** (13.34)	0.913	3.239*** (12.54)	0.894	4.379*** (16.23)	0.971	3.125*** (11.91)	0.880	2.929*** (10.52)	0.851
Observations	28,887		28,297		28,887		25,994		28,887		25,047	
Number of firms	4,090		4,073		4,090		3,936		4,090		3,977	
Pseudo- $R^2$	0.19		0.19		0.20		0.23		0.20		0.19	

Notes: The estimates were obtained using a probit model. Columns 2, 4, 6, 8, 10, and 12 report the marginal effects evaluated at covariate means. The dependent variable is a dummy equal to one if the firm is a bond issuer, and zero otherwise. Robust z-statistics in parentheses. All firm-specific variables are lagged one period. Time, industry and country dummies are included in the models.

issuance over a three-year period (columns 7 and 8), which averages out the effects of frequent refinancing or periodic financing for a longer duration.<sup>10</sup> We augment our models with market development indicators for size and trading volume (columns 9 and 11). We report coefficient estimates from probit models in odd numbered columns with marginal effects reported in even numbered columns. Country dummies are reported to investigate the differences between issuance behaviour in the national corporate bond markets; we take Korea as our reference country.

Looking at the simplest linear model in column 1, as expected the size of the firm has a positive impact on the probability to issue a bond, indicating that the larger is the firm the more likely it is to issue bonds with a marginal effects of a 1% increase in real assets resulting in a 0.04 increase in the probability that a firm will issue bonds. This result may reflect the high fixed costs of issuing bonds that favour larger firms, or it may be a result of the greater information asymmetry problem that small firms face and the finding is consistent with results reported in papers that use these arguments (see Calomiris *et al.*, 1995, Johnson, 1997, Cantillo and Wright, 2000, and Dennis and Mihov, 2003). Size is also found to be a key determinant of a firm's decision to issue bonds in studies of Latin American bond markets (see Borensztein *et al.*, 2008). Growth in sales also has a small positive effect on the decision to issue bonds (the marginal effect is 0.008). We conclude that there is a minimum efficient scale to overcome before bond finance is economically feasible, and the decision to access bond markets is driven by financing needs proxied by growth in sales. The probability of bond issuance also marginally decreases with the number of years a firm has been listed on the stock market which implies that bonds and stocks are substitutes. This result is in line with earlier reported evidence in Latin American bond markets in Borensztein *et al.* (2008).

The financial health indicators of the firm show that creditworthiness has a role to play in determining the probability of bond issue. The higher firms' leverage (LEVER) the more likely they are to issue corporate bonds. The positive effect is economically significant since a unit increase in leverage would increase the probability of bond issuance by 0.09. Similar findings have been reported for Latin America. The economic reason for this result involves demand and supply side influences. On the supply side, higher leverage can be taken as a sign that firms have been able to access debt from banks or markets in the past, perhaps in order to realise growth opportunities or as a sign of overindebtedness. On the demand side, the higher the leverage the higher may be the rollover needs of the firm, stimulating issuance. In order to allow for potential nonlinear effects we re-estimate the model in column 5 with a quadratic term in LEVER. We find that higher debt to assets has a diminishing effect on issuance, and beyond some point further leverage reduces the probability of issuance. There is clearly a nonlinear effect.

<sup>10</sup> Note that the average bond maturity in our sample is 6.07 years which is comparable with figures reported in Batten *et al.* (2012) for several Asian economies.

The same is true for liquidity. Liquidity can be a useful source of co-funding, and may be positively associated with bond issuance since firms that intend to invest increase liquid assets prior to issuing bonds. But it is also true that beyond some level, firms with greater liquidity may not require additional financing through the bond market, as suggested by Guariglia *et al.* (2011) and Song *et al.* (2011). When we allow for non-linear influence of liquidity on issuance in column 5, we find that liquidity has a positive effect on issuance, while the square of liquidity has a negative effect.

Higher profitability (PROF) and collateral (COLL) are characteristics that might be expected to have a positive influence on the decision to issue bonds. We find it raises the probability of issue by 0.06 in column 1 and collateral increases the issuance probability by 0.08. This is a consistent result across most columns of Table 3, which suggests that these two variables are important for Asian firms. The evidence in other regions reported by Borensztein *et al.* (2008) is mixed: two recent studies for Latin American countries find positive and significant coefficients, while two others find negative or insignificant coefficients.<sup>11</sup> Given that profitability may not have as much importance for Asian firms as it does for Western firms, we replace it with a measure of cash flow. Our results in column 3, show that the impact of other variables is unchanged when we include cash flow, and cash flow itself has a significant positive effect on issuance.

In columns 1, 3 and 5 we consider the impact of our covariates on the issuance decision in the same year, but it is conceivable that some firms may issue only occasionally for longer periods. To check this possibility we consider whether our covariates influence the probability of bond issuance over a three-year period in column 7.<sup>12</sup> Compared to the results in column 5, the sign and significance of our variables hardly changes, although the marginal effects tend to fall, and the interpretation of their effects does not change.

The specifications in columns 9 and 11 take the model used in column 5 and allow for bond market size and market liquidity (trading volume), respectively. Both variables are expected to increase the desirability of issuing bonds because larger and more liquid markets reduce the costs of issue for firms, and lower the cost of entering and exiting the market for investors. We find that a larger local currency bond market has a small positive influence on issuance, but trading volume does not have a significant impact.

<sup>11</sup> A negative coefficient would be consistent with the pecking order theory of Myers and Majluf (1984), where more profitable firms seek alternative, lower cost, forms of finance rather than bond finance. In the Latin American studies above, where the coefficient is negative, the data contain both listed and unlisted firms, and listing has a negative effect on the probability of bond issuance. In our case all firms are already listed and therefore have met the profitability threshold to obtain equity finance, and greater profitability would not necessarily alter incentives based on the pecking order theory to issue equity instead of bonds.

<sup>12</sup> The number of observations is lower compared with the other regression models due to the construction of the three-year average of the bond issuance variable.

In all our models we have country dummies to explore the heterogeneity in our sample compared to a reference country, Korea. We observe a distinct difference in the probability of issue simply based on the country in which the firm is located. For all firms in our sample, we find those located in Taiwan, Malaysia, and Singapore are much more likely to issue compared to firms in Korea, and firms in China, Hong Kong SAR, the Philippines, and Thailand show a more moderate probability of issuance. Only Indonesian firms are less likely to issue than Korean firms; Indonesia stands out as the least developed bond market. Firms in other countries have a higher probability of issuing than Korean firms, which probably reflects the fact that issuance in Korea is dominated by large firms, while smaller firms are very unlikely to issue. The differences in the probabilities of issuance between countries are not dependent on our choice of the reference country.

## 5.2 Difference-in-differences results

In order to separate policy influences from the general expansion of market size and liquidity, we introduce Taiwan as a control. Taiwan experienced a similar trajectory of bond market development as the rest of the region, but it did not participate in the ABF, ABF2, and the ABMI initiatives. Taking the probability of issuance in the policy initiative period for the group of countries that participated versus Taiwan, we obtain a difference-in-differences estimate of the influence policy initiatives had on firms in the eight country group that experienced the policy treatment. None of the firms we examine issued bonds in the pre-policy period, some of them issued bonds in the period after 2003. Since we have firms in countries where a policy was implemented to encourage bond market development, and firms in Taiwan, where there was no such policy, we can examine whether firms in the countries influenced by the ABF, ABF2, and the ABMI initiatives were more likely to issue than firms in Taiwan, after controlling for the firm-specific and market development influences identified in Table 3. Our argument is that if regional bond market development were responsible for further increases in the probability of issuance, then we would find a significant difference in the probability of bond issuance between the two groups.

Our results in Table 4 illustrate this point. The POLICY term is a measure of the impact of the policy treatment on the probability of issue. The results indicate that these policies had a positive and significant effect on the probability of issue for firms in countries that participated in ABF, ABF2, and ABMI raising the probability of issue by 0.06 in column 1. Subsequent columns include the market development variables measuring the scale of local currency markets and their trading volume. The coefficient on the policy variable takes a similar magnitude (0.06–0.09). These findings confirm that the ABF, ABF2, and the ABMI initiatives implemented from 2003 raised the probability of issuing bonds in countries that participated in the policy compared to Taiwan, which did not participate. By way of illustration, the scale of the increase due to policy measures is equivalent to the firm having a 1% increase in its tangible asset to total asset ratio, or a 2.4% increase in its size, or having a 2% increase in its profits.

**Table 4** Policy effects on the decision to issue

	1	2	3
POLICY	0.060*** (10.09)	0.066*** (10.24)	0.086*** (8.46)
SIZE	0.026*** (21.45)	0.016*** (22.40)	0.028*** (20.69)
GROWTH	-0.003 (-1.14)	-0.001 (-0.56)	-0.003 (-1.31)
YEARS	0.0001 (1.35)	0.002*** (5.18)	0.001* (1.70)
LEVER	0.119*** (10.43)	0.137*** (11.94)	0.128*** (10.31)
PROF	0.039*** (4.50)	0.053*** (6.09)	0.038*** (3.97)
COLL	0.059*** (2.62)	0.071*** (3.12)	0.047* (1.88)
LIQUID	-0.003 (-0.15)	-0.025 (-1.09)	0.008 (0.30)
LEV <sup>2</sup>	-0.075*** (-6.86)	-0.085*** (-7.56)	-0.081*** (-6.96)
LIQUID <sup>2</sup>	-0.012 (-0.54)	-0.0001 (-0.00)	-0.025 (-1.01)
LCY		0.0001 (0.57)	
TRVOL			0.0002*** (2.72)
Observations	28,222	28,222	24,437
Number of firms	4,066	4,066	3,954
R-squared	0.12	0.11	0.12

*Notes:* The estimates were obtained using a difference-in-differences estimator. The dependent variable is a dummy equal to one if the firm is a bond issuer, and zero otherwise. POLICY takes value one if the country participated in the ABMI and ABF initiatives, and value zero otherwise. Robust t-statistics in parentheses. All firm-specific variables are lagged one period. Time dummies, industry dummies and country dummies are included in the models.

### 5.3 Direct and indirect effects of bond market development

By looking at periods before and after the policy initiative we can determine whether market development advantaged all firms (through statistically significant direct effects) or some firms (through statistically significant indirect effects). Direct effects are measured in the same way as they were reported in Table 3, and measure the reduction in cost of bond market participation for issuers and investors as markets develop. Indirect effects are measured by interactions between market liquidity and market size and the balance sheet variables of the firm used in Table 3.

Therefore, in Table 5 we explore the impact of interactions between market development indicators and firm-specific variables for firms that are issuers in a

Table 5 Market indicators

	IND = LCY Coeff. 1	M.E. 2	IND = TRVOL Coeff. 3	M.E. 4
SIZE	0.229*** (12.67)	0.030	0.247*** (20.30)	0.032
SIZE*IND	-0.002*** (-4.96)	-0.0003	0.0001*** (4.82)	0.00002
GROWTH	0.064 (1.16)	0.008	0.062* (1.72)	0.008
GROWTH*IND	0.0003 (0.16)	0.00004	-0.00007 (-0.28)	-0.000006
YEARS	0.006 (1.05)	0.001	-0.007** (-2.01)	-0.001
YEARS*IND	0.0002 (1.01)	0.00001	0.0001 (1.60)	0.00002
LEVER	1.056*** (5.19)	0.138	1.364*** (8.35)	0.178
LEVER*IND	0.040*** (4.36)	0.005	0.006*** (2.76)	0.001
PROF	0.792*** (4.21)	0.104	0.584*** (4.30)	0.076
PROF*IND	-0.010 (-1.54)	-0.001	-0.002** (-2.49)	-0.0001
LIQUID	0.004 (0.01)	0.001	1.027*** (3.67)	0.134
LIQUID*IND	0.021 (1.55)	0.003	-0.003* (-1.92)	-0.0004
COLL	1.148*** (3.47)	0.150	0.105 (0.42)	0.014
COLL*IND	-0.018 (-1.57)	-0.002	0.006*** (2.63)	0.001
<i>LIQUID</i> <sup>2</sup>	-0.406** (-2.29)	-0.053	-0.733*** (-4.67)	-0.096
<i>LEV</i> <sup>2</sup> *IND	-0.040*** (-3.87)	-0.005	-0.006** (-2.07)	-0.001
<i>LIQUID</i> <sup>2</sup>	-0.143 (-0.37)	-0.019	-1.092*** (-3.71)	-0.143
<i>LIQUID</i> <sup>2</sup> *IND	-0.024* (-1.67)	-0.003	0.003 (1.50)	0.0003
IND	0.043*** (4.28)	0.006	-0.003*** (-3.42)	-0.0003
Observations	28,887		25,047	
Number of firms	4,090		3,977	
Pseudo- <i>R</i> <sup>2</sup>	0.19		0.20	

Notes: The estimates were obtained using a probit model. Columns 2 and 4 report the marginal effects evaluated at covariate means. The dependent variable is a dummy equal to one if the firm is a bond issuer, and zero otherwise. Robust z-statistics in parentheses. All firm-specific variables are lagged one period. In columns 1 and 2 *IND* is a variable measuring the size of local currency bond obligations as a percentage of nominal GDP. In columns 3 and 4 *IND* denotes the extent of trading in the secondary market relative to the amount of bonds outstanding. Time dummies, industry dummies and country dummies are included in the models.

probit model. The results are comparable to those reported in Table 3, but they include indirect and direct effects. Results in column 1 report the effects of market size ( $IND = LCY$ ), and in column 2 reports the influence of market liquidity ( $IND = TRVOL$ ). As already noted,  $LCY$  is a variable measuring market size based on the size of local currency bond obligations as a percentage of nominal GDP.  $TRVOL$  is a variable measuring market liquidity based on the extent of trading in the secondary market relative to the amount of bonds outstanding.

The direct effect is measured by the coefficient on the  $IND$  term; we observe that market size has a small direct effect on probability of issue in column 1 and market liquidity has a small negative effect on probability of issue in column 2. The indirect effects demonstrate that as the market increases in scale, the size of the firm becomes marginally less important, and leverage of the firm becomes marginally more important. As market liquidity increases, so the age of the firm and the profitability of the firm matter marginally less. It is clear however, that these indirect effects have very small marginal influence compared with the marginal effects of the balance sheet variables themselves.

We reproduce the exercise in order to obtain a difference-in-differences estimate. The main finding here is that the policy influence remains important even in a model where we include interaction terms, and many of the same interaction terms that had significant coefficients in Table 5 are still significant in the difference-in-differences model.<sup>13</sup>

Next, we focus on the influence of market size and market liquidity in two sub-periods: 1995–2002 and 2003–2007. For reasons already stated, we expect that while policy initiatives were relatively modest in terms of size, they sent a positive signal to bond markets, and provided many market facilitating policies that could improve bond market function, size, and liquidity. This in turn could have promoted the use of the corporate bond market by firms in the region. Therefore, we explore whether direct and indirect effects of market size and market liquidity were more pronounced after 2003. To preserve space, the results of the sample splits are not reported—they are available in the on-line Appendix. We do report, however, the tests of equality in Table 6.

If we find equality of coefficients, this would suggest market development indicators had no greater effect on corporate bond issuance before the policy initiatives were implemented than afterwards, while rejection of equality of coefficients would suggest differences between periods after the policy was effected.<sup>14</sup>

We find we can reject the null of equality of coefficients across the sample splits, when considering the direct effect, for both market size and market liquidity models. Similarly, we find we can reject the null of equality of coefficients across the sample splits, when considering the indirect effect, in seven out of 18 cases for market size and for seven out of 18 cases for market liquidity. Therefore, we

<sup>13</sup> These results, which are not reported in the interest of space, can be found in the online Appendix.

<sup>14</sup> Examination of the coefficient marginal effects shows there was a larger positive influence or a smaller negative influence in the second period when coefficients were not equal.



Table 6 Test for the equality of coefficients based on sample splits

	IND = LCY 1	IND = TRVOL 2
SIZE	0.52	0.00
SIZE*IND	0.00	0.00
GROWTH	0.86	0.22
GROWTH*IND	0.16	0.80
YEARS	0.26	0.10
YEARS*IND	0.74	0.07
LEVER	0.00	0.00
LEVER*IND	0.06	0.28
PROF	0.00	0.73
PROF*IND	0.38	0.29
LIQUID	0.84	0.00
LIQUID*IND	0.58	0.28
COLL	0.09	0.65
COLL*IND	0.67	0.86
LEV <sup>2</sup>	0.08	0.06
LEV <sup>2</sup> *IND	0.00	0.02
LIQUID <sup>2</sup>	0.83	0.45
LIQUID <sup>2</sup> *IND	0.56	0.85
IND	0.00	0.02

Notes: We present p-values of a test statistic where the null hypothesis is the equality of the coefficients.

conclude that split sample results confirm our earlier findings by demonstrating direct effects were significantly stronger after the policy was initiated compared to the pre-policy period, and indirect effects were significantly stronger for roughly half of the interactions, and equal in the others.

6. Conclusions

The degree of financial integration in Asia varies considerably across the various national capital markets. The governments in the region have attempted to make the development of regional bond markets a high priority, see Ma *et al.* (2005). This paper has examined the determinants of bonds issuance using a novel firm-level dataset for several emerging Asian economies. After controlling for firm-specific characteristics and general bond market characteristics, we examine the impact of ABMI and ABF reforms undertaken to enhance the regional bond market.

Our conclusion is that firm-specific characteristics have the most impact on the probability of issue. This is in line with other studies that consider the influence of firm-specific characteristics driving the decision to issue bonds in emerging Latin American markets, for example, see Borensztein *et al.* (2008). We confirm that the ability of firms to convince investors, underwriters and rating agencies that their bond issues are viable, is a vital matter. When we explore a difference-in-differences

model, controlling for these covariates and comparing the countries that participated in the bond market development policies versus Taiwan, we still find a positive and significant policy effect. This proves to be very robust, suggesting the policy did have a significant effect on firms' decisions to issue bonds. A further analysis of direct versus indirect effects of market development before and after the policy was carried out also confirms this view, since we reject the null hypothesis of equality of coefficients for direct effects and roughly half of the interactions measuring indirect effects.

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## Supplementary material

Supplementary material (the Appendix) is available online at the OUP website.

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